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BLUE - GREEN ALGAE

This article has been contributed by the Institute of Natural Resources and Environment Division of Water Resources, Griffith Laboratory, CSIRO.

New found fame has escalated toxic blue-green algae from a naturally occurring phenomenon, to one of the nation's most critical water quality issues.

The presence of blue-green algae in Australian rivers, lakes, dams and estuaries is widespread. Every mainland State has recorded outbreaks and the threat they pose has been well publicised by the media.

Blue-green algae, known within the scientific community as Cyanobacteria, grow naturally in most bodies of water.

Microscopic plants. algae thrive on a combination of nutrients, light, warmth and calm conditions.

Blue-green algae can be found at various depths within a body of water. However, when conditions are favourable a bloom is triggered and the algae will appear in abundance at the surface.

Algal blooms often take on the appearance of bright green sawdust before forming a mat or scum on water surfaces. Their smell ranges from musty and earthy odours to a putrid stench, which is most noticeable when decomposition begins.

A concern to health and the environment

Them are many species of blue-green algae but only a few are toxin producing. In the non-toxic form, the algae make drinking water unattractive and smelly. The toxic variety are a major health and ecological concern.

There are three main genera of toxin producing algae in Australia. Anabaena produces an alkaloid nerve toxin, which can cause muscular and respiratory disorders; Microcystis and Nodularia produce peptide toxins which can kill liver cells.

No human deaths have been recorded following consumption of water infected by toxic algae. However, several ailments are associated with human consumption or skin contact. These include gastroenteritis, liver damage and dermatitis. There is also concern that the toxins promote liver cancer.

Stock deaths are widespread and occur when stock consume algal scum which has accumulated on the banks of water supplies.

Inland water ecosystems also face an enormous threat from the presence of blue-green algae.

As the surface scum begins to die and decompose, the toxins are released and the oxygen supplies on which vegetation, fish and other water life depend, are depleted.

Why blooms occur

While it is recognised that enrichment with nutrients, light, warmth and still or calm waters encourage the growth of blue-green algae, the occurrence of these factors alone does not necessarily precipitate a bloom. The combination of factors required to trigger a bloom remains poorly understood.

Calm waters, maximum light penetration, and warm surface temperatures are common to lakes, reservoirs and farm dams during the summer months when most major blooms are recorded. Rivers are also left vulnerable at this time due to restricted water flow from irrigation offtake.

One major cause of deteriorating water quality is overloading of Australian inland waters with nutrient pollutants, particularly phosphates. Development, industrialisation and farming have resulted in poorly treated sewerage and agricultural and urban run-off entering our river systems.

Eutrophication (nutrient enrichment) is recognised as a critical factor in creating an algal bloom and a key to their prevention through effective catchment management.

How blooms and their toxins are treated

At present, there are only three commonly used methods for removing blue-green algae and their toxins from water; algicides, dissolved air flotation and activated carbon.

Algicides, such as copper sulphate, are effective in killing algal blooms, however, there are distinct disadvantages in their use - they kill indiscriminately. The algicides are toxic to many aquatic life forms, not only algae, can kill fish and damage the delicate ecosystem of inland waters.

While an algicide will kill an algal bloom, this itself creates a problem. Once the treatment has been applied the algal cells rupture, releasing toxins into the water supply.

A second treatment for use in large-scale water facilities involves the bubbling of air into a holding tank where the algae are floated to the surface and are then removed. This method is expensive and fails to remove any toxins already released into the water supply.

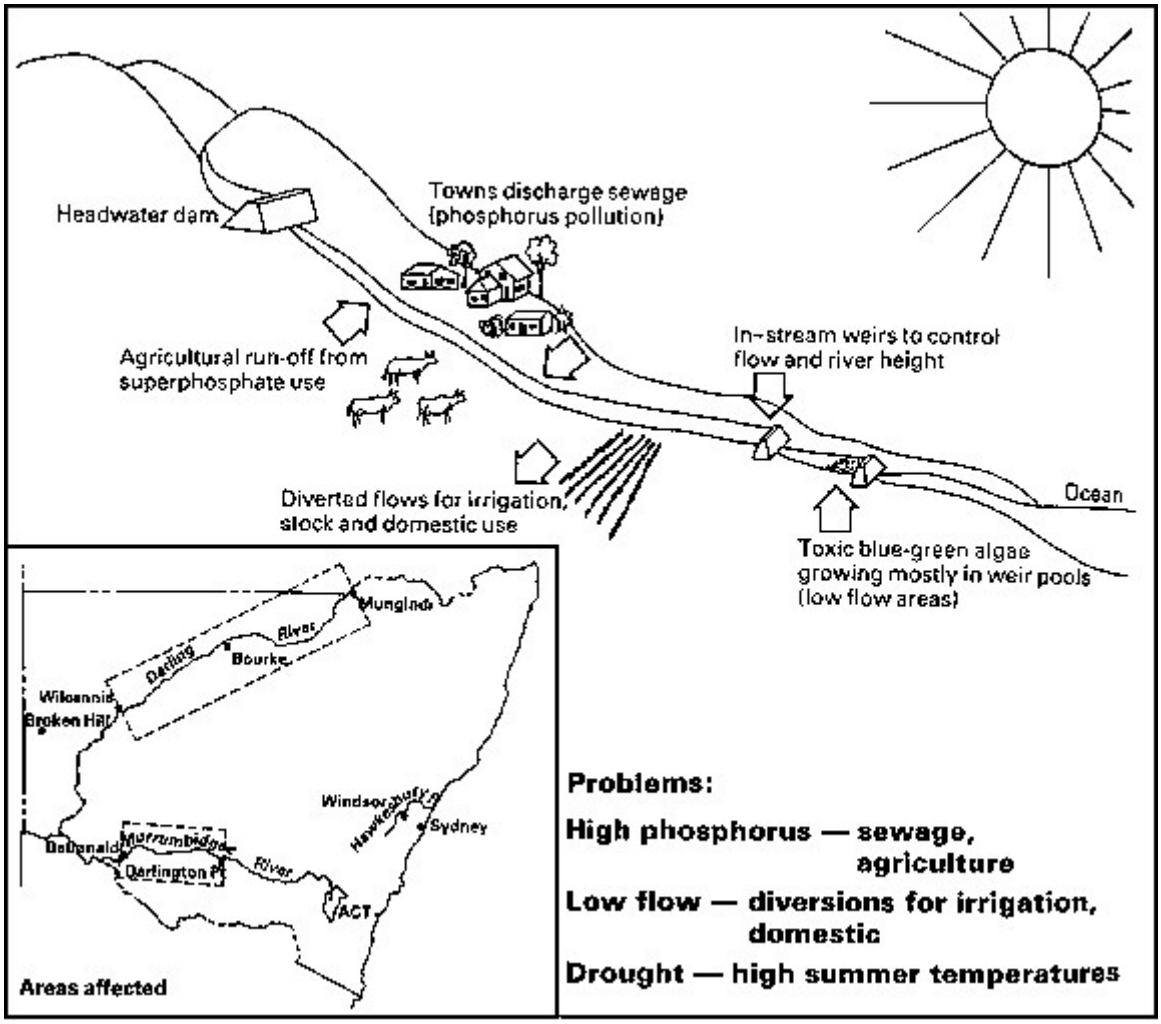
A third method, the use of activated carbon has been found to be the most effective method to date for the safe removal of algal toxins and associated odours from water. The carbon can be applied in a granular or powdered form to filtration units to absorb the contaminants, although it is essential that correct dosing rates and contact times are employed.

How Australia has reacted to the problem

The severity and frequency of algal outbreaks during the period between October 1991 and January 1992, has resulted in public outcry. Government, industry, scientific and community recognition of the nature of the problem has created a foundation for national commitment.

Already, special task forces have been initiated, research dollars have been bolstered and public concern for the future of Australian inland waters has given a new priority to water quality issues.

TOXIC ALGAE IN RIVERS



Source: Institute of Natural Resources and Environment, Division of Water Resources, Griffith Laboratory, CSIRO.

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